American Options Pricing by Using Stochastic Optimal Control Problems

Stochastic optimal control problems frequently occur in Economics and Finance. Dynamic programming method represents the most known method for solving optimal control problems analytically. As analytical solutions for problems of optimal control are not always available, finding an approximate solution is at least the most logical way to solve them. In this paper, we present some of the basic ideas which are in current use for the solution of the dynamic programming equations. Also, based on the Markov chain approximation techniques, a numerical procedure is constructed for solution of stochastic optimal control problems. We focus on the approximation in value space method. And the Jacobi and Gauss-Seidel relaxation (iterative) methods are discussed. These are fundamental iterative methods which are used in value space approach. Finally, American options pricing are presented as simplest control problem which is called optimal stopping problem.

Keywords: